

Atty Docket No.: CPH35726-D

Serial No.: 10/072,362

REMARKS**Present Status of Patent Application**

Claims 10-18 remain pending of which claim 10 has been amended and claims 13-18 has been newly added, to more clearly describe the claimed invention. Further, the Drawings (FIG. 2C and FIG. 4D). It is believed that no new matter adds by way of these amendments made to the claims or specification, or otherwise to the application. For at least for the following reasons, Applicant respectfully submits that claims 10-18 patently define over the prior art of record. Reconsideration is respectfully requested.

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Objection to Drawing

The Office Action objected to claims 10-12 because Fig. 2C contains informal handwritings, and alleged separate sheets accompanying the 9/0/03 amendment is not found. A proposed drawing correction or corrected drawings are required in reply to the office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

In response thereto, Applicants attach the corrected Drawing as a separate accompanying sheet. Reconsideration is respectfully requested.

Objection to Claims

The Office Action objected to claims 10-18 because of the following informalities and/or defects: In claim 10, the term "active" in line 4 should read as -active region--; at the end of claims 10, 13 and 16, the term "trench" should read as -trenches--; and claims 10, 13 and 16 each recite the subject matter that a deep source region extending from the first shallow doped region and a second deep drain region are disposed in a region within the substrate deeper than the first and second trenches, but each fail to clarify what the relationships between the second deep drain region and the second shallow doped region and between the first deep source region and the second deep region; and furthermore, the term "second portion of the electrode" recited in claims 10, 13 and 16 should read -the second vertical portion--. Appropriate correction is required.

In response thereto, Applicants have amended claims 10, 13 and 16, and after entry of the above amendments to claims 10, 13 and 16, it is believed that the above objections to claims 10-18 can be overcome. Reconsideration is respectfully requested.

Response to Claims Rejections under 35 USC§112

1. The Office Action rejected claims 10-15 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

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In rejecting the above claims, the Examiner indicated that claim 13 recites the subject matter that the deep source/drain regions are doped with dopants of a conductivity type opposite to that in the first and second shallow dopants, but according to the original disclosure, especially in FIG. 4D, the deep doped regions (306) and the shallow regions (304) are of same type, and there is no real boundaries therebetween.

In response thereto, Applicants would like to thank the Examiner for pointing out the informalities, and accordingly amended FIG. 4D to show the boundary between the shallow doped region 304 and the deep doped region 306, which is also consistent with FIG. 2G. A corrected FIG. 4D is attached hereto as a separate accompanying sheet. Reconsideration is respectfully requested.

2. The Office Action rejected claims 16-18 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In rejecting the above claims, the Examiner indicated that claim 16 recites the subject matter "bisecting said first and second portions together", but fails to clearly and definitely define the subject matter of the instant invention that the horizontal portion connects the first and second vertical portions together, as the word bisecting may also mean to cut or divide into two parts, according to the American Heritage Dictionary of the English language.

In response thereto, Applicants amended the language of Claim 16 to read connects instead of bisecting to avoid confusion. After entry of the above amendment to Claim 16, it is believed that the above rejections can be overcome. Reconsideration is respectfully requested.

Response to Claims Rejections under 35 USC§102

The Office Action rejected claims 10, 12, 13, 15, 16 and 18 under 35 U.S.C. 102(b), as being anticipated by Lancaster et al. (US-4,835,584, hereinafter Lancaster).

Applicants respectfully disagree and traverse the above rejections as follows.

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Independent claim 10, as amended, is allowable for at least the reason that Lancaster substantially fails to teach, suggest or disclose every features of the claimed invention. More specifically, Lancaster fails to teach, suggest or disclose a MOSFET device comprising at least "a gate electrode disposed over said thick insulating layer in said first and second trenches, the gate electrode comprising a first vertical portion, a second vertical portion and a horizontal portion, wherein the first vertical portion is embedded inside the first trench completely filling a remaining portion of the first trench, the second vertical portion is embedded inside the second trench completely filling a remaining portion of the second trench, and the horizontal portion is disposed over the substrate and connects said first and second vertical portions together, as required by the amended claim 10". The advantage of the above structure is that at least the above gate structure can be fabricated from a more simplified method. Further, the effective width of the gate can be effectively increased by 2nt while at the same time the lateral surface occupation of the gate can also be effectively reduced and thereby allowing increase in the integration of the semiconductor device.

To the contrary, Lancaster substantially discloses (please see FIG. 5H-5J and related disclosure) a semiconductor structure comprising a plurality of trenches formed side by side into the substrate, a gate electrode (58) formed continuously over the trenches (56) bisecting a pair of trenches. The trenches are filled with a dielectric material (70) after forming the gate electrode (58). In other words, the dielectric material (70) is deposited over the vertical portions of the gate electrode (58) in the trenches, and therefore it is clear that the vertical portions of the electrode (58) is not formed over the dielectric layer (70) in the first and second trenches as required by the amended claim 10 of the claimed invention. Accordingly, Applicant respectfully submits that Lancaster cannot possibly anticipate Claim 10 in this regard.

For at least the foregoing reasons, Applicants respectfully submit Claim 10 and 12

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patently define over Lancaster. Reconsideration and withdrawal of these rejections is respectfully requested.

Further, Applicants respectfully submit that independent claims 13 and 16 is allowable over Lancaster for at least the reason that Lancaster fails to teach, suggest or disclose a MOSFET device comprising at least "a first shallow doped region having dopants of first type within the substrate disposed at an upper corner adjacent to the first vertical portion and a second shallow doped region having dopants of first type disposed at an upper corner adjacent to the second vertical portion of the electrode; and a first deep source region having dopants of second type extending from the first shallow doped region and a second deep drain region having dopants of second type are disposed in a region within the substrate deeper than the first and second trench as required by Claims 13 and 16." Instead, Lancaster substantially teaches (please see FIG. 5K and col. 4, lines 46-48) a source/drain region (73, 74). In other words, Lancaster substantially fails to teach, suggest or disclose at least a first shallow doped region and a second shallow doped region having dopants type different from that of the source/drain region. Accordingly, Applicant respectfully submits that Lancaster cannot anticipate Claims 13 and 16 of the claimed invention in this regard.

For at least the foregoing reasons, Applicants respectfully submits that newly added Claims 13-18 also patently define over Lancaster as well. Reconsideration is respectfully requested.

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Response to Claims Rejections under 35 USC§103

The Office Action rejected claims 11, 14 and 17, insofar as being in compliance with 35 U.S.C. 112 and being best understood in view of the claim objections above, under 35 U.S.C. 103(a) as being unpatentable over Lancaster in view of Kimura et al. (US-5,029,321, hereinafter Kimura).

Applicants respectfully disagree and would like to point out that even though the Office Action relied upon Kimura to disclose the thermal oxidation process for forming the gate oxide layer, still Kimura cannot cure the specific deficiencies of the claimed invention for at least the reasons as substantially discussed above. Accordingly, Applicants respectfully submit that Claim 11 also patentably define over Lancaster and Kimura for at least the reasons set forth above. Reconsideration is respectfully requested.

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CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 10-18 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

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Respectfully submitted,
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